# NASA Sounding Rockets Program

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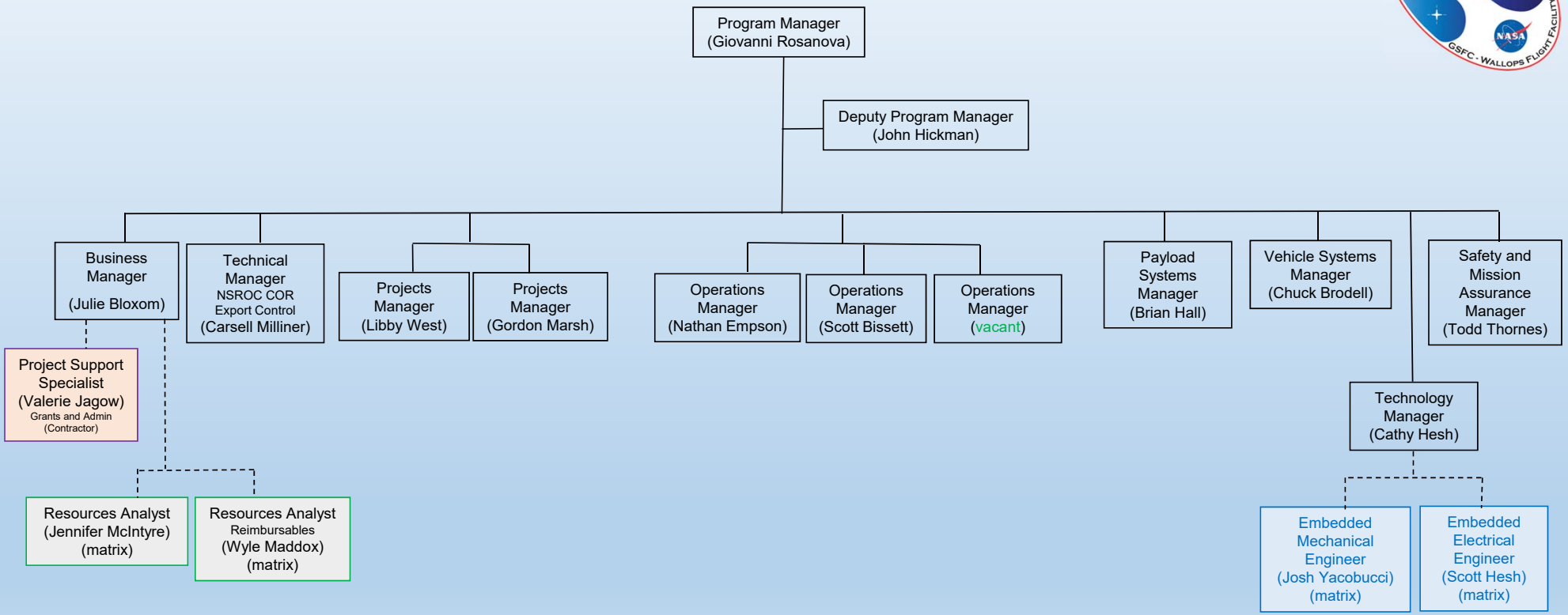
Program Manager

# Sounding Rockets Program Office Organization



# Nature of the NASA Sounding Rockets Program

- Characteristics
  - Low cost
    - Part of the NASA Low Cost Access to Space (LCAS) program
  - Quick turn around
  - Rely on military surplus rocket motors as much as possible to reduce cost
  - Acceptance of higher technical risk
    - Lower consequence
    - Higher probability of issues or failure
  - Minimalistic project teams
  - Highly flexible and agile
  - Non Mil-Spec components
  - Governed by NPR 7120.8 (Research and Technology)
  - World-wide mobile operations
  - Implemented via the NASA Sounding Rocket Operations Contract (NSROC)
- Highly successful for NASA Science Mission Directorate
  - Cutting edge science is being conducted
  - Enables instrument development that ports into future orbital missions
  - Scientist development

**Student and faculty members inspect their instrument prior to integration with the university outreach payload RockSat-X**

**Science team members during recovery operation to retrieve their payload at White Sands Missile Range**

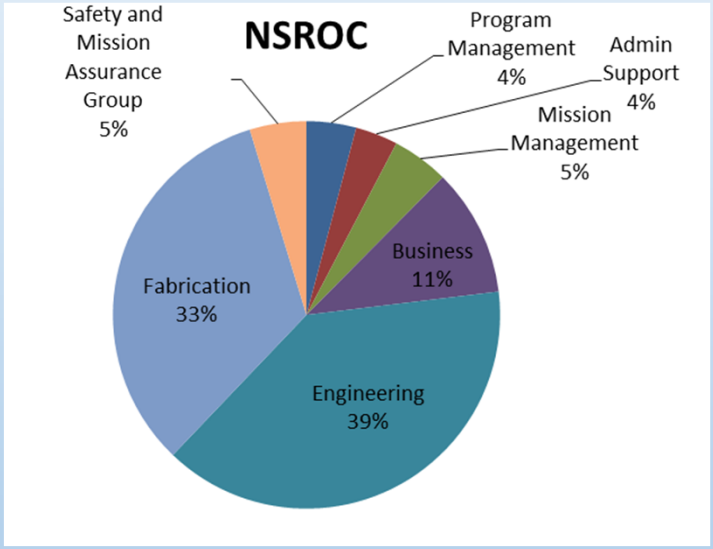
# Services Provided

- **Payload Development**
  - Attitude Control Systems
    - Magnetic, Inertial, Rate Control, Celestial, Solar
  - Telemetry Systems
    - 10 Mb/s standard, 20 Mb/s available
    - Command uplink & Video downlink
  - Payload Recovery Systems
  - Boost Guidance Systems
    - Aerodynamic control for early portion of powered flight
  - Experiment Structures
  - Deployment Systems
- **Mission Analysis**
  - Flight performance
  - Ground and Flight Safety
- **Launch Vehicles**
- **Operations Support**
  - Mobile range development
  - Launcher servicing and erection
  - Field operations
- **Technology Development**

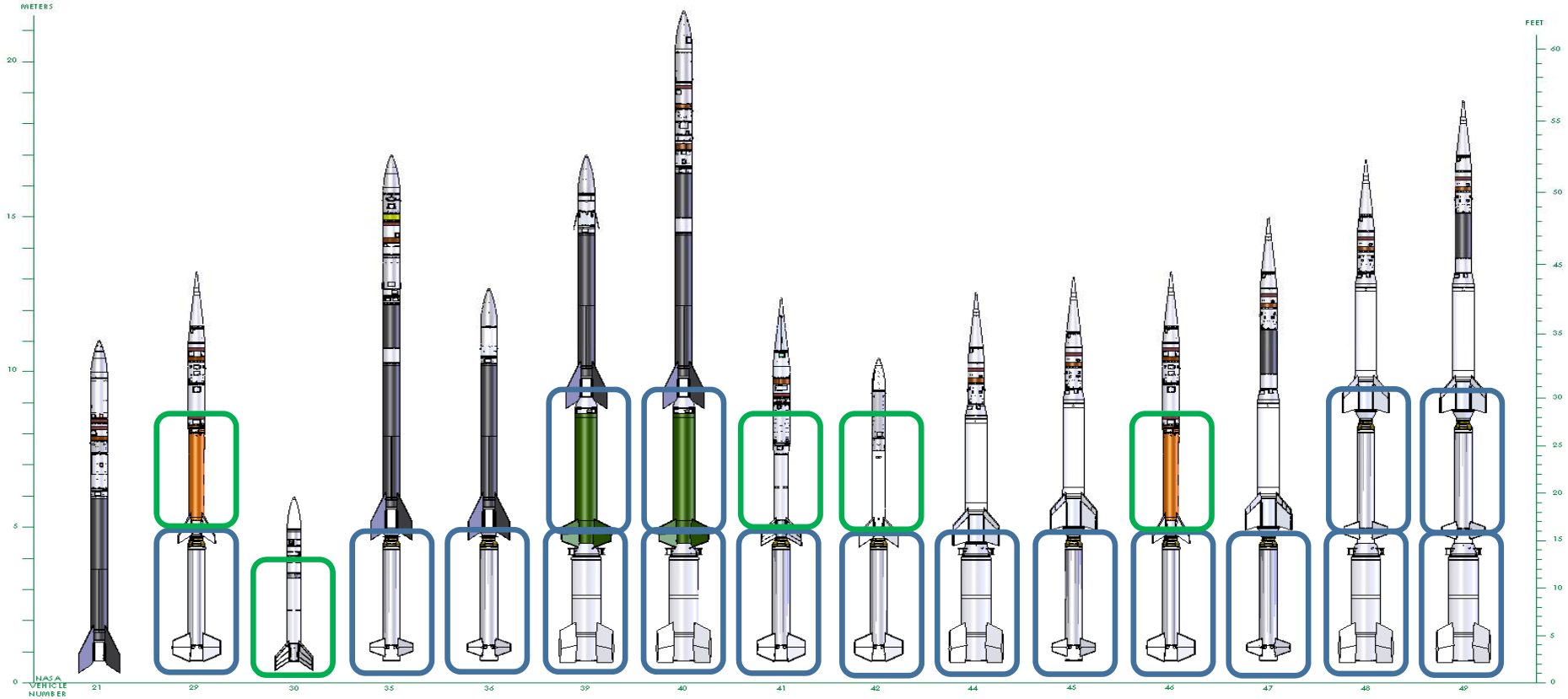
# NSROC details

Support Provided:

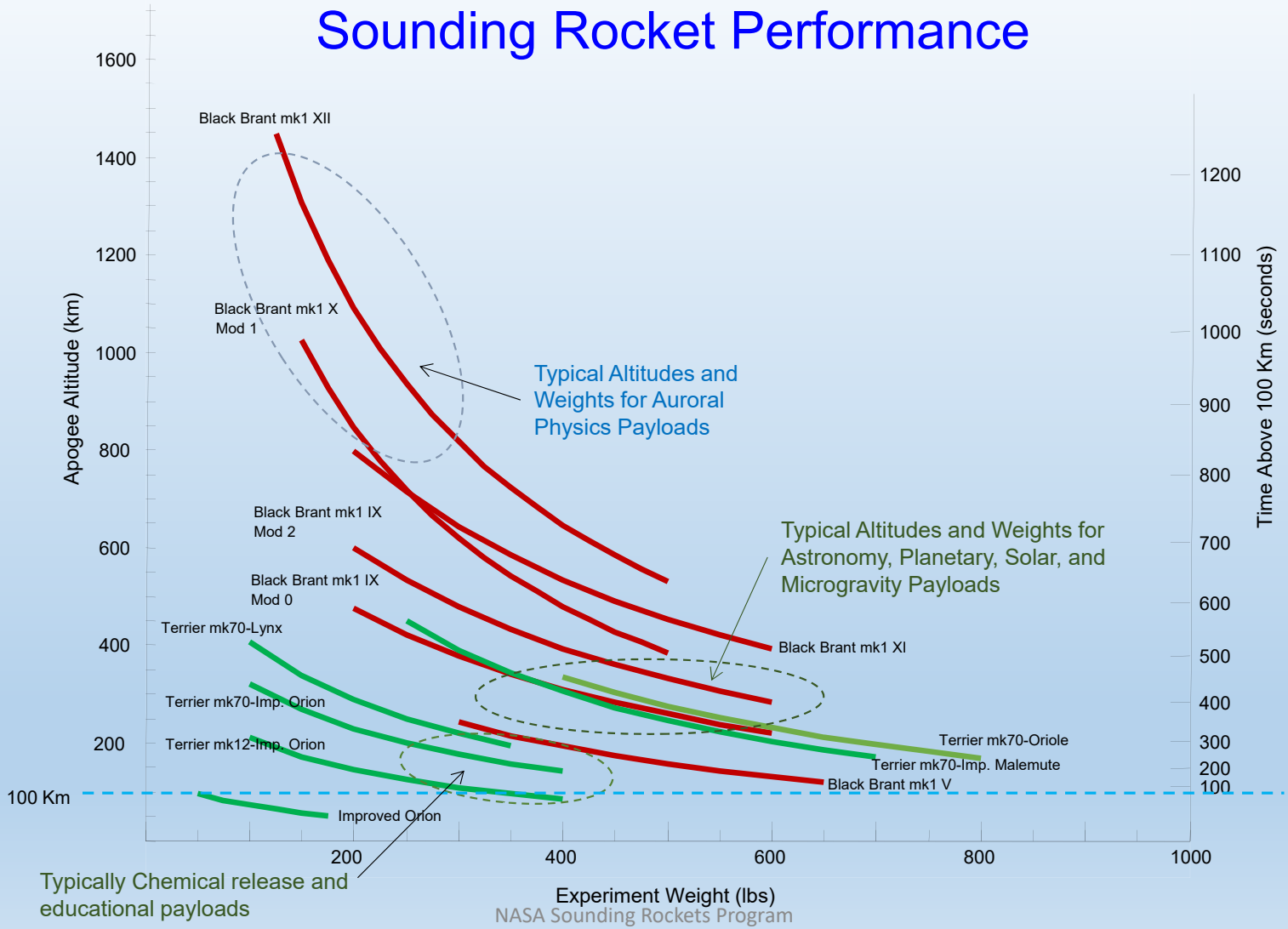
- Contract Program Management
- Project Management
  - ~50 ongoing flight projects
- Hardware Procurement
- Engineering Design
  - Payloads and missions
  - Flight performance analysis
  - Flight subsystem tech development
- Fabrication Support
  - Sounding rocket activities
  - Wallops activities (customer funded)
- Environmental Testing
  - Vibration, balance, vacuum, deploy, etc.
  - Sounding Rocket activities
  - Wallops activities (customer funded)
- CONUS logistics support
- Field operations support



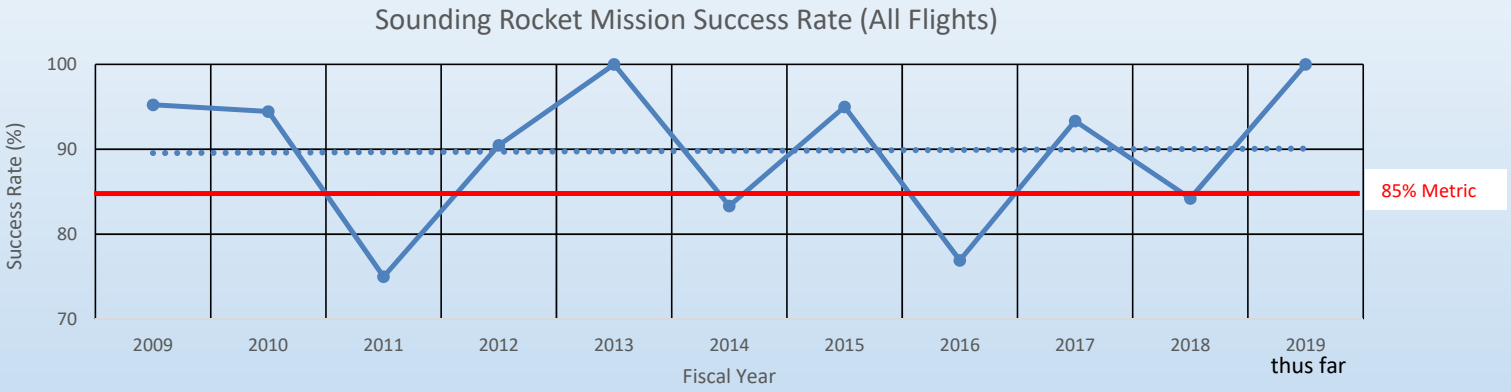
# Launch Vehicles



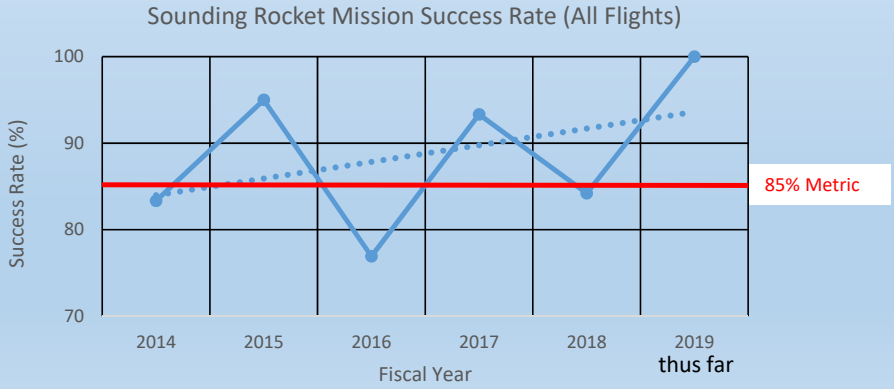
# Sounding Rocket Performance



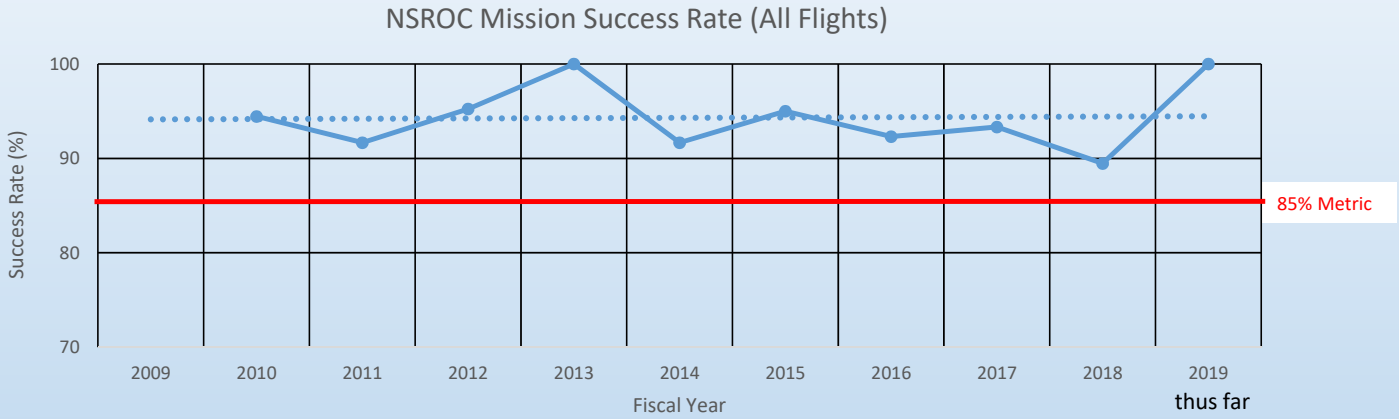
# Program Success Rates



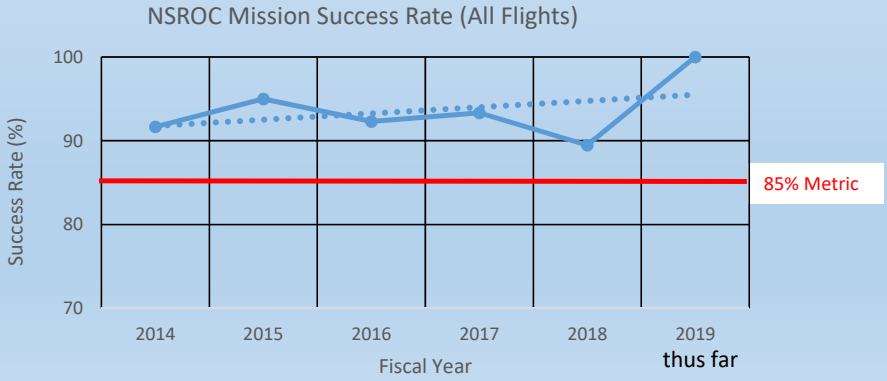

Note: Mission success includes all aspects of the mission: NSROC, science instruments, science, range support.



# NSROC Success Rates

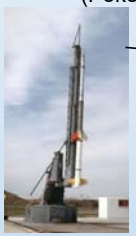



The SRPO and NSROC strive to make our support systems as reliable as practical given Program resources.



# World-Wide Operations

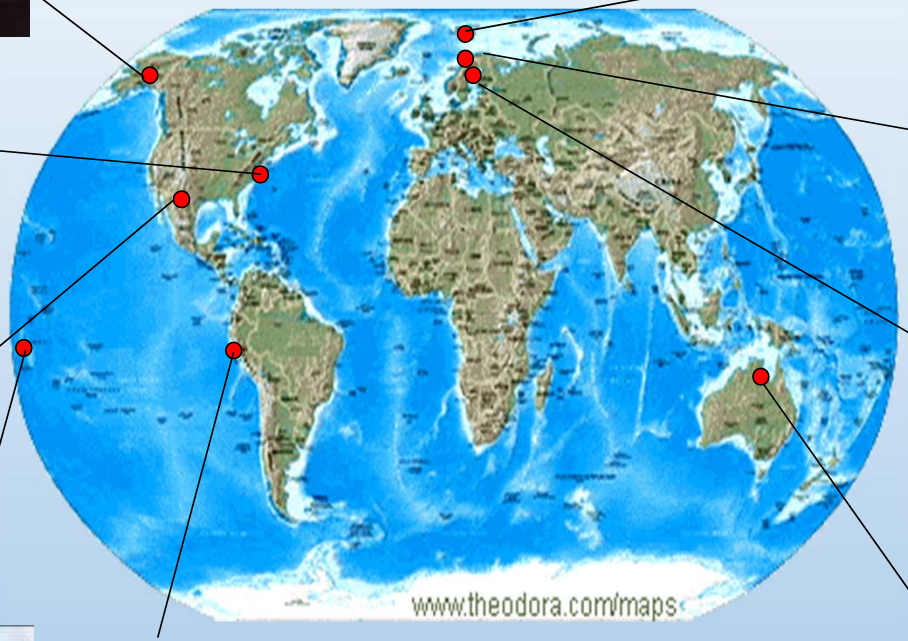
Alaska
(Poker)



Wallops

White Sands

Kwajalein




Peru

Svalbard (Norway)

Norway

Sweden

Australia

**The Sounding Rocket Program "goes to where the science is…"**

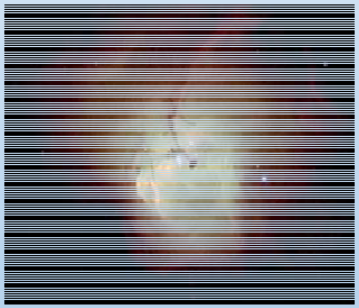
# Types of Missions

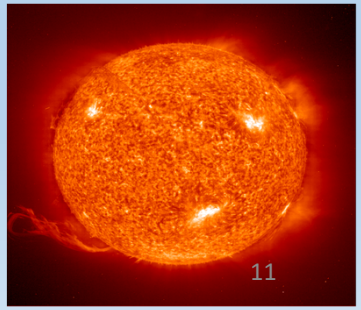
- Geospace (Plasma Physics)
- Solar Telescopes
- Astronomy Telescopes
- High Speed Aerodynamics and Propulsion
- Entry and Descent
- Technology Development
- Educational

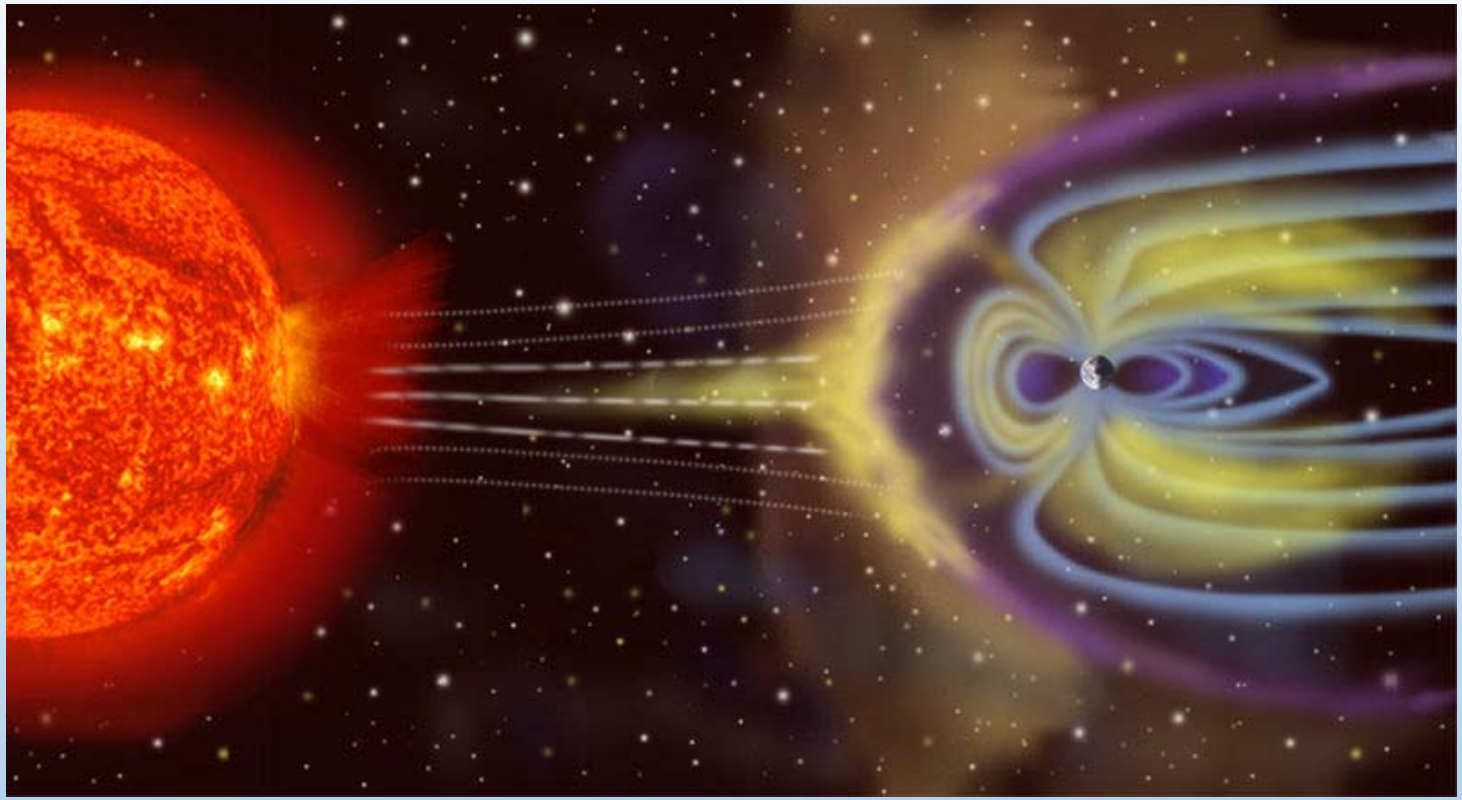
- Approx. 50 payloads/missions active at any given time
- Approx. 18 flights/year









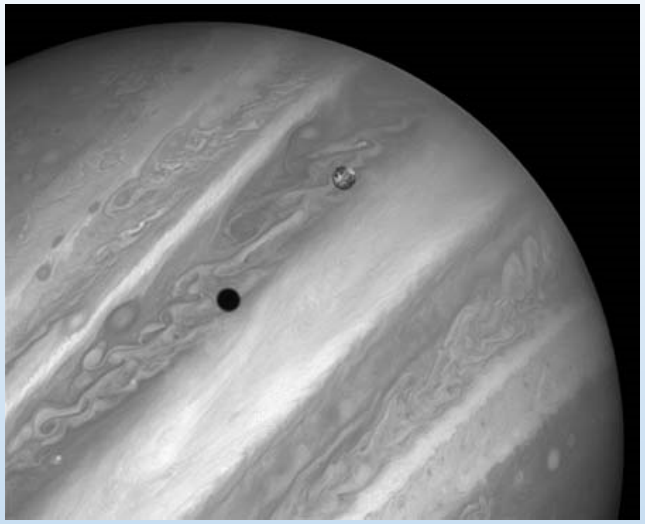


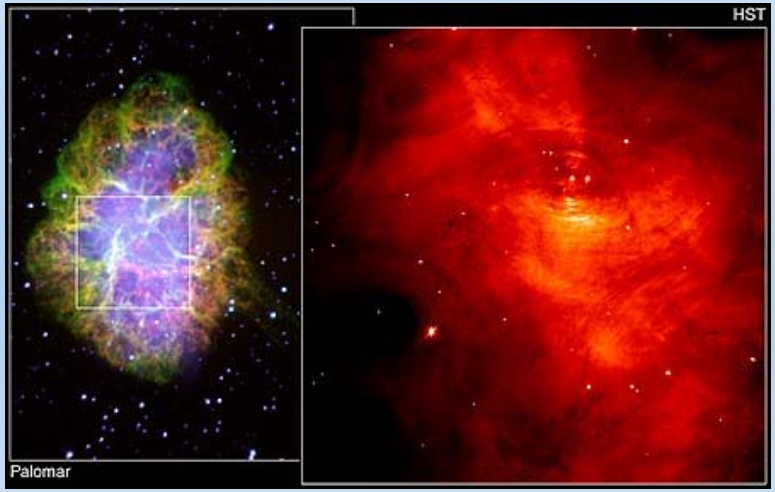
Solar wind compresses the Earth's magnetic field. Solar storms can compress the magnetic field even further. The increased pressure increases the amount of plasma that passes through the magnetosphere

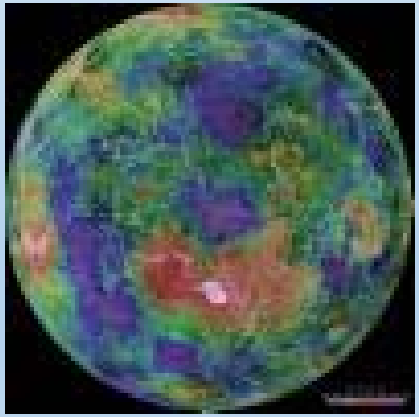
The interaction of the solar plasma with the Earth's magnetic field creates the Aurora Borealis

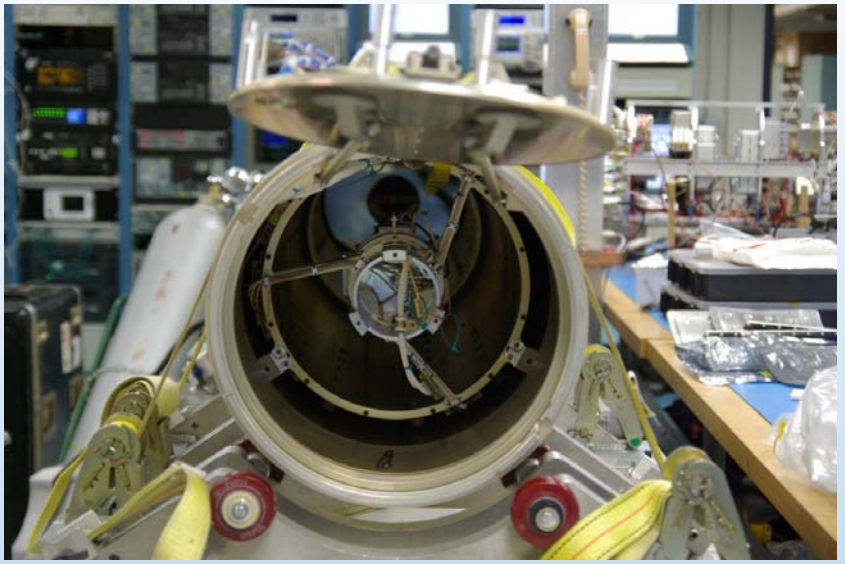
Trimethylaluminum (blue & white) and Lithium (red) releases over the Kwajalien Atoll (May 2013)

# Astrophysics Research

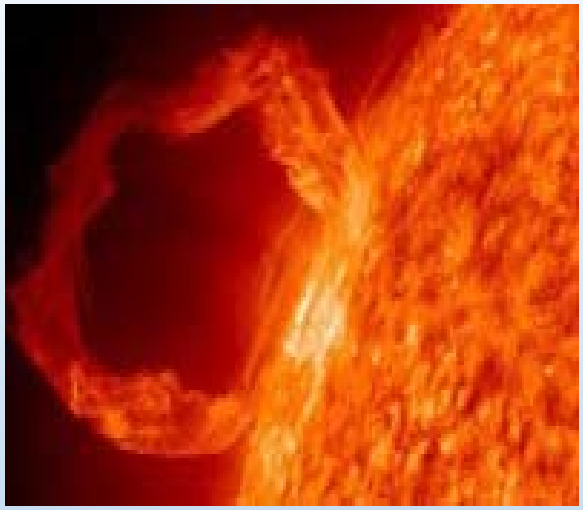


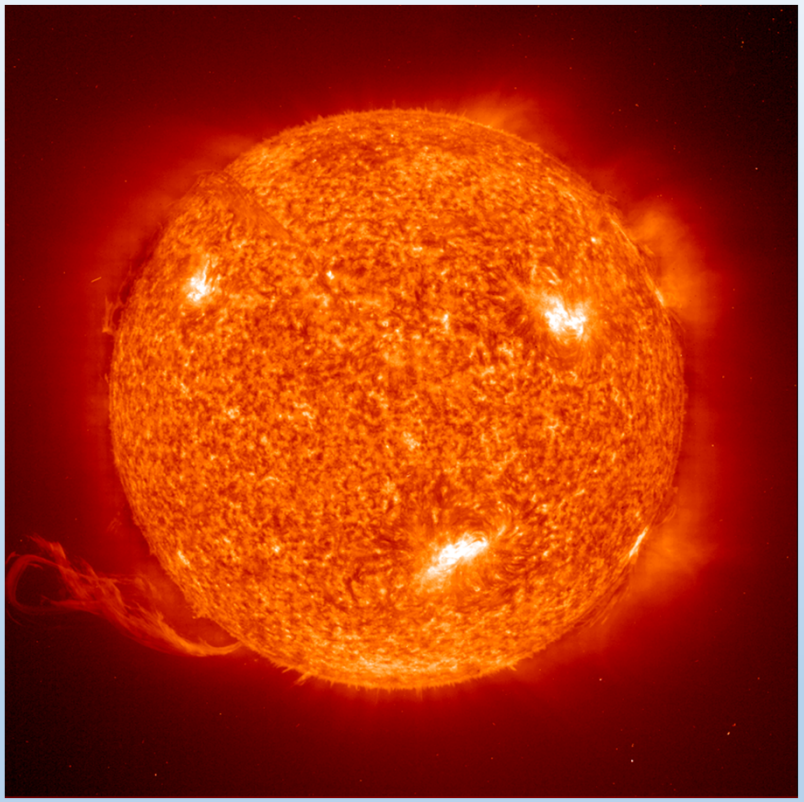




# Solar Research





- Hubble can’t look at the Sun
- Sounding rocket missions are used to determine calibration factors for orbiting satellites like the Solar Dynamics Observatory (SDO)

# Technology Development